by the Zoological and Acclimatisation Society of Melbourne; a Dorsal Squirrel (*Sciurus hypopyrrhus*) from Central America, a Greater Sulphur-crested Cockatoo (*Cacatua galerita*) from Australia, twenty-five Indian Crocodiles (*Crocodilus palustris*) from India, deposited.

OUR ASTRONOMICAL COLUMN

PARALLAXES OF SOUTHERN STARS.—We learn from Mr. Gill, H.M. Astronomer at the Cape, that he has completed a memoir on the parallax of some of the principal southern stars, founded upon observations by himself and Dr. Elkin; the memoir contains investigations on parallax of

By Gill { α Centauri (two series with different comparison-stars); Sirius; ϵ Indi; Lacaille 9352 (Gould's star with proper motion of 7″); o^2 Eridani, and β Centauri.

By Elkin { α Centauri (two series with different comparison-stars from Gill's); Sirius; ϵ Indi (also with different stars); ζ Tucani; *e* Eridani and Canopus.

Mr. Gill's important memoir has been communicated to the Royal Astronomical Society, and its publication will doubtless be awaited with much interest by astronomers.

The large proper motion of Lacaille 9352 was detected by Dr. Gould, and announced in No. 2377 of the *Astronomische Nachrichten*. The annual P.M. in arc of great circle is 6″·96 in the direction 79°·2. It is a star of 7·5 m. in Piscis Australis: Mr. Stone's place for 1880·0 is in

R.A. 22h. 58m. 5·43s., N.P.D. 126° 32′ 40″·0.

In only one instance has the existence of a larger proper motion been discovered, viz. in that of the well known 6·7 m. Groombridge 1830 in Ursa Major, where the amount is 7″·05. *e* Eridani, 4·4 m., is in R.A. 3h. 15m. 8·16s., N.P.D. 133° 31′ 46″·8 for 1880, according to Stone, who attributes to it an annual proper motion of 3″·0 in the direction 75°·5. ζ Tucani, a fourth magnitude, is in R.A. oh. 13m. 48·60s., N.P.D. 155° 34′ 49″·0 for 1880, with an annual proper motion of 4″·35 on an angle of 74°·8, by Stone's values.

Mr. Gill expects to be in England early in February, to superintend a large amount of official printing, for which he brings copy with him.

PONS' COMET.—For a few evenings this comet will form a pretty conspicuous object as it descends in the south-western sky; after it ceases to be visible in Europe observations may be continued at the observatories of the other hemisphere for several months. On March 26 the theoretical intensity of light will be ten times, and a month later, five times, greater than at the beginning of September, when the comet was discovered through the diligent scrutiny of the heavens, followed up by Mr. Brooks, who found it considerably beyond the limits of the sweeping ephemerides then in the possession of observers. Mr. S. C. Chandler has conjectured that a meteor-stream may be connected with this comet. MM. Schulhof and Bossert's orbit for 1884 gives the radiant in R.A. 197°·8, Decl. + 67°·3.

THE MINOR PLANETS.—The *Berliner Astronomisches Jahrbuch* for 1886 contains elements and approximate ephemerides for the present year of 231 of the known members of this extensive group, only four therefore being omitted in the absence of the necessary data. In addition there are twenty-six accurate opposition-ephemerides. Four of these small planets approach the earth, within her mean distance from the sun, in 1884. At the end of December No. 132 *Æthra*, situate in the vicinity of α Orionis, will approach the earth within 0·85, and shining as a star of the ninth magnitude, will afford another favourable opportunity for the investigation of solar parallax, on the method advocated by Mr. Gill.

SCIENCE IN RUSSIA [1]

THE *Memoirs* (*Zapiski*) *of the Novorossian Society of Naturalists*, at the University of Odessa, founded only in 1873, have already reached their eighth volume, and contain a good deal of valuable work. Confining our analysis to the last three volumes, we notice in them the following papers:—In the domain of geology Prof. Sintsoff contributes several papers. One of them is an elaborate monograph on the sponges from the chalk of Saratoff. Revising his former work on the same subject, and taking advantage of the well-known work of Prof. Zittel, as well as of new extensive collections, M. Sintsoff creates a number of new species and four new genera: *Mæandroptychium*, which he proposes to substitute for those of *Cæloptychium*, *Etheridgia*, and *Tremabolites*; *Labyrintholites*, closely allied to *Plocoscyphia*; *Polyscyphia*, akin to the preceding; and *Zittelispongia*. The author describes (with figures) seven species of the first, four species of the second and the third, and one species of the fourth, as well as the following species:—*Cuculispongia triloba*, Trautschold, *Craticularia cylindrica*, Mischl.; two species of *Ventriculites*, two species of *Coscinopora*, *Leptophragma simplex*, T. Smith, *Actinosiphonia radiata*, Fisch., and the new species *Hallirhoa peskowi* and *Isoraphinia cavata*.—The same author contributes a second paper on Mesozoic fossils from Simbirsk and Saratoff (the first paper having appeared in vol. iv.), and describes the following species:—*Ammonites longispinus* and *caletanus*, *Scalaria dupiniana*, var. *rhodani*, *Astarte beaumontii*, *Panopæa neocomiensis*, and as new species *Aporrhais striata-carinata*, *Nucula subarduennensis*, and *Lucina neutralis*.—A third paper by the same author contains a description of the following Tertiary fossils of Novorossia:—*Dreissena rostriformis*, Desh., *Hydrobia mathildæformis*, Fuchs, *H. dimidiata*, Eichw., *Valvata variabilis*, Fuchs, *Neritina danubialis*, Pfeif., var. *liturata*, Eichw., *N. prevostriana*, Partsch., and *N. capillacea*, Brusina, from the Pliocene; *Trochus rollandianus*, d'Orb., *Phasianella kischinerviæ*, d'Orb., and as new species *Trochus minutus*, *semistriatus*, and *elegantulus*, *Hydrobia substriatula*, *Amnicola cyclostomoides*, and *Valvata pseudo adeorbis*, from the Miocene. All these fossils are represented in the plates.—M. Prendel contributes a paper on the geological structure of the districts of Elizabethgrad and Alexandria, in the government of Kherson. The rocks are granites, mostly as schists, and considered by the late Barbot-de-Marny as a product of metamorphism of sedimentary rocks, and very small patches of Huronian schists, covered with numerous isolated islands of Eocene. The whole is covered with the "White Sands," where M. Prendel has found a stem of *Cupressonoxylum severzovi*, Merklin (Miocene?), and with loess, which contains, besides the usual fossils, remains of *Arctomys bobac*, which does not now extend in Russia south of 52°–54° N. lat.—The same author contributes (vol. viii.) another paper on the crystalline rocks on the Bazavlouk and Saksagan Rivers, right tributaries of the Lower Dnieper. The paper is accompanied by a map of coloured sections of microscopic specimens of crystalline rocks.

The chief papers in these *Memoirs* are however devoted to comparative anatomy and zoology. Without attempting to summarise their varied contents, we can merely enumerate most of them. All are profusely illustrated with plates. In the sixth volume we notice a preliminary communication by Madame Olga Mechnikoff, on the anatomy of cartilaginous fishes; and a note, by Prof. H. Mechnikoff, on the larva of the *Anisoplia*.—M. Repyakoff contributes an elaborate paper on the morphology of the *Bryozoa*. Without attempting to determine the place that the Bryozoæ ought to occupy in systematic classification, the author devotes his special attention to the relations between the two great subdivisions of the Endoproct and Ectoproct Bryozoæ, and his paper is a valuable contribution to the work undertaken by Nitsche, Hatschek, Joliet, and Barrois.—M. Zabarinsky contributes a paper on the morphology of the Hydra.—In vol. vii. M. Buchinsky publishes a paper on the development of the earthworm, devoting his special attention to the development of its mesoderm and of its nervous system.—In vol. viii. M. Krasilschik contributes an elaborate paper on the development of the *Polytrema*, and the place it occupies with regard to other Flagellatæ; M. Repyakoff publishes a note on the larvæ of the *Polygordius flavocapitatus*; M. Depp, on the life of the Macropodes; and M. A. Kovalevsky, on the development of the Chiton.—In physiology we notice the researches, by M. Spiro, into the development of bile, being the result of various experiments, and accompanied with tables showing the dependence of its amount upon the food.

In botany we find the researches by M. Rishavi on the development of the organs of reproduction in *Dasya elegans* (vol. vi.); a list of lichens collected on Mount Castel in the Crimea, and determined by Dr. Brutann in Dorpat (vol. vii.); and a work, by M. Kojernikoff, on the anatomical structure of the corolla in flowers. The author has extended his researches

[1] *Memoirs of the Novorossian Society of Naturalists* (*Zapiski Novorossiyskago Obschestva Estestvoispytateley*), vols. vi., vii., and viii. Odessa.

to a great number of flowers, and has come to the conclusion that, however great the analogy between the petals and the leaves, still the former have a series of well-established anatomical features which enable us to characterise them as well as any other part of the plant. Some of their anatomical features can be explained by the physiological function of the organ, whilst the others have no connection with them, and the explanation of these peculiarities must be sought for elsewhere—says the author—in the yet unknown internal structural form of the plant as also, perhaps, in the position occupied by the flower in the whole of its organic life.

In chemistry and physics we notice two papers, by M. Tanatar, on the fumaric and maleinic acids (vol. vi.), and on their compounds with chlorite (vol. viii.); by M. Klimenko, on the lactic and propionic acids (vol. vi.); by M. Melikov, on the compounds of acrilic acid; and by M. Geritch, on electrical phenomena observed during the diffusion of several liquids.

A paper of general interest, intended to show some relations between animals and plants at their lowest degrees of development, is contributed by M. Shmankevitch (vol. vii.). When the Flagellate, *Anisonema acinus*, Blütochli—having a relatively high organisation—is cultivated for many generations in a medium which is slowly modified, for instance, in sweet water to which a certain amount of lake salt is added, its structure is modified, in proportion as the concentration of the solution of salt is increased. The individuals become less developed, their size diminishes, and the feeding-canal loses its former development. Numberless intermediate forms between the *Anisonema acinus* and its new, less developed representatives, make their appearance, as well as between these and the still lower *Anisonema sulcatum*, which would be thus but a lower organised variety of the former. When the concentration of the medium in which the *Anisonema* lives is carried on side by side with a change of temperature of the medium, the transformation goes further on, and the lowest *Anisonemæ* are transformed on the one side into algæ-like organisms, and in another direction into organisms which seem to belong to the category of fungi. The individuals not only become smaller, but they give rise also to a progeny long before reaching their full size. Under the influence of the sun's rays the uncoloured Flagellatæ acquire a new physiological function, and develop chlorophyll. "We see thus," the author says, "the beginnings of two kingdoms, animal and vegetable, radiating from one common stem. We see the transformation of one of them into the other, not only in its morphological features, but also in its physiological functions, under the direct influence of physical and chemical agencies. The saline solutions, as compared with sweet water, diminish the size of the lower organisms, and at the same time they contribute towards the development of chlorophyll in the sweet-water algæ, thus giving them, so to say, a more vegetable character, together with an increased productivenes." And further: "While descending from the *Anisonema sulcatum* to a unicellular alga, we see the regressive development, a simplification of organisation; we descend towards the plants containing chlorophyll. . . . While descending from the same *Anisonema* on another branch, we enter into the region of such lower organisms which, under the influence of another medium, do not develop chlorophyll, and having no nutrition from the air, find their food from the substratum; they could be described as parasitic Rhizopodæ, and this the more as from the fungoid form we can ascend, under some circumstances, not only towards the Amœba-like uncoloured Flagellata, but also towards the moving Monad. On the contrary, by reversing the physical agencies, we can arrive, from the unicellular alga, as well as from the fungoid form, to an uncoloured form having the structure of the *Anisonema*." The researches of A. Giard, Cienkowsky, and Famintzyn, and some observations by Ray Lankester, seem to be, in the author's opinion, in accordance with the above.

PROFESSOR HAECKEL ON THE ORDERS OF THE RADIOLARIA[1]

[THE following translation of a recent paper of mine, by Miss Nellie Maclagan, has been revised by myself.—ERNST HAECKEL.]

THE "Outline of a Radiolarian System founded on Studies of the *Challenger* Radiolaria," published by me in the *Jenaische Zeitschrift für Naturwissenschaft* (Bd. xv. pp. 418-472), shortly before starting for Ceylon in October, 1881, gave a very short survey of the systematic results of the researches which I had been carrying on since 1876 among the inconceivably rich Radiolarian material of the *Challenger* collection. At that time I distinguished in this Rhizopod class seven different orders (p. 421) and 24 families, containing in all 630 genera ("Prodromus Systematis Radiolarium," *l.c.*, pp. 423-472). I was able even then to distinguish no less than 2000 new species, and this goodly number has since been considerably increased. Further investigations corroborated all the principal essential points of the views then briefly given as to the morphologico-phylogenetic conditions of relation among this Protista class, but I gradually came to simplify my views as to the relation of the principal groups, and have now reduced the seven orders to four, which makes the complicated system much more comprehensible.

The systematic arrangement of the 15 families, given in my "Monographie der Radiolarien," 1862 (following Johann Müller, who first broke ground in his treatise, 1858) was essentially improved by Richard Hertwig, whose admirable work on the "Organismus der Radiolarien," 1879, thoroughly explained for the first time the difficult histology of these Protista, and definitely determined their unicellular nature, despite all peculiar modifications of the cell structure. On the ground of important differences discovered by him in the structure of the membrane of the central capsule, and the consequent varying comportment of the passage of pseudopodia, Hertwig distinguished the following six orders (*l.c.* p. 133):—1. *Thalassicollea*, monozoic uninuclear Radiolarians, having the capsule membrane pierced on all sides: skeleton siliceous, irregular, or wanting. 2 *Sphærozoea*, polyzoic multinuclear Radiolarians, having the capsule membrane pierced on all sides: skeleton siliceous, irregular, or wanting. 3. *Peripylea*, monozoic uninuclear Radiolarians, having the capsule membrane pierced on all sides: skeleton siliceous, consisting of fenestrated spheres or modified fenestrated spheres or disks. 4. *Acanthometrea*, monozoic uninuclear Radiolarians, having the capsule membrane pierced on all sides: skeleton non-siliceous, consisting of twenty spicules arranged according to J. Müller's law. 5. *Monopylea*, monozoic uninuclear Radiolarians, the capsule open on one side, and with a peculiar porous area: skeleton siliceous. 6. *Tripylea*, monozoic uninuclear Radiolarians; capsule membrane double, with one principal and two accessory openings; skeleton siliceous, formed of tubes.

As I found that the important differences in the structure of the membrane of the central capsule and the consequent passage of the pseudopodia, discovered by Hertwig in the comparatively limited material at his disposal, were corroborated in their most essential points by my researches among the wider world of the *Challenger* Radiolaria, I adopted his scheme in my "Conspectus Ordinum Radiolarium Classis," 1881 (*l.c.* p. 421), but with this difference, that I divided Hertwig's *Sphærozoea* into two orders—*Symbelaria* and *Syncollaria*. The latter, *Syncollaria*, includes the families of the *Sphæroïdoida* in the wider sense, and, from the absence or incompleteness of the skeleton, corresponds as a polyzoic group to the monozoic *Thalassicollea*, whilst the former, *Symbelaria*, includes the family of the *Collosphærida* in the wider sense, and by its spherical, reticulate, siliceous skeleton corresponds as a polyzoic group to the monozoic *Peripylea*.

Recent researches, which have brought to light an immense number of new, hitherto unknown Radiolarians belonging to the last-mentioned groups, have, however, convinced me that the distinction between the monozoic (solitary) and the polyzoic (social) Radiolarians is of much less importance than was formerly supposed. They are as insignificant and of as little value in forming a system as the differences between monozoic Hydropolyps (*e.g. Hydra*, *Myriothela*) and polyzoic Hydropolyps (*Tubularia*, *Coryne*), or as the differences between solitary Infusoria (*Vorticella*, *Trichodina*) and social Infusoria (*Carchesium*, *Epistylis*). According to Hertwig, the essential difference between the two groups is that the solitary *Thalassicollea* are uninuclear, the social *Sphærozoea* (= *Symbelaria*) multinuclear. Nevertheless, the central capsule in all Radiolaria (without exception) is uninuclear at an early stage and multinuclear later on. We would require to be more exact about this distinction, inasmuch as in the *Sphærozoea* (= as in the *Acanthometrea*) the division of the simple nucleus into a number of nuclei (spore nuclei) takes place at a very early period, whilst in the *Thalassicollea* (as in the other Radiolaria) it only takes place later on. This relative modification is, however, of no standard value

[1] "Separat-Abdrück aus den Sitzungsberichten der Jenaischen Gesellschaft für Medicin. und Wissenschaft." Jahrg. 1883. Sitzung. von 16 Februar.